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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/519,107

12/23/2004

Yoshiyuki Suzuri

04890/HG

9443

1933 7590 04/29/2008  
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EXAMINER

NELSON, MICHAEL E

ART UNIT

PAPER NUMBER

1794

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04/29/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/519,107 | <b>Applicant(s)</b><br>SUZURI ET AL. |  |
|                              | <b>Examiner</b><br>MICHAEL E. NELSON | <b>Art Unit</b><br>1794              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03/13/2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 6-7,9-15,17,19-28,30 and 31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,8,16,18,29 and 32-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of Claims***

1. In response to Applicant's reply dated 03/13/2008, Claims 1-5, 8, 16, 18, 29, and 32-36 are pending. Claims 6, 7, 9-15, 17, 19-28, 30 and 31 have been withdrawn as directed to a non-elected species. The specification has been amended. The claims have not been changed.

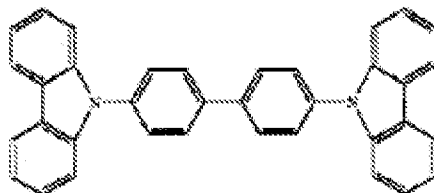
### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

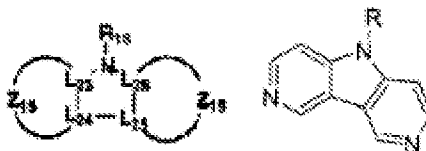
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5, 8, 16, 18, 29, 32, 34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adachi et al. (6,458,475) in view of Ueda et al. (JP 2001-160488) with evidence supplied by Wieczorek et al. (Archivum Immunologiae et Therapiae Experimentalis, vol. 34, no. 3, pp. 323-326, 1986).

4. Concerning claims 1-4, 8, 16, 18, 29, 32, and 34, Adachi et al. describe a blue electroluminescent device based on a blue phosphorescent light emitting material doped into a dicarbazole-biphenyl (CBP) host (shown below) (claims 1, 3-4, and 6). Adachi et al. are silent on the use of a diazocarbazole compound in the electroluminescent device.

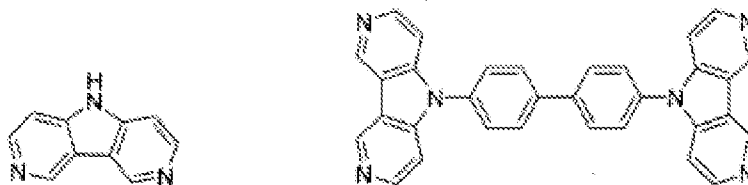


5. Ueda et al. describe electroluminescent devices wherein at least one layer of the device incorporates a molecule of the following general formula [0028] where  $Z_{15}$  is an aromatic heterocycle, specifically including pyridine [0046] and  $Z_{16}$  is an aromatic heterocycle or aromatic hydrocarbon, where the heterocycle also includes pyridine [0047]. Ueda et al. give several specific examples, (XVII-1 to XVII-8) which illustrate that the position of the nitrogen atoms in the ring  $Z_{15}$  and  $Z_{16}$  are not critical to the function of the molecule as an electroluminescent material. Based on the general teaching by Ueda et al., the second structure shown is immediately envisaged.



6. Based on the close similarity in structure to carbazole, and the fact that the structure described by Ueda et al. is known as an electroluminescent material, and since the immediate precursor (first compound shown below) to a CBP analog (second compound shown below) is a known compound, as evidenced by Wiczorek et al., and since Ueda et al. disclose the reaction of nitrogen-containing carbazole compounds with aromatic halides [0094], to show that extra nitrogen atoms in the carbazole analog do not affect the coupling reaction, it would have been obvious to one of ordinary skill to synthesize the analog for use as a host material in a phosphorescent

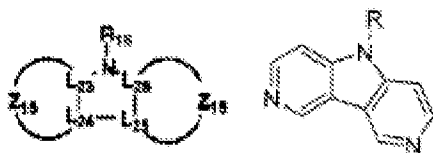
electroluminescent device as described by Adachi et al., since the material would be predicted to function in the same manner as CBP.



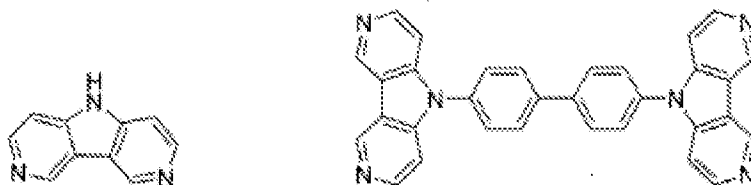
7. Concerning claim 5, the molecular weight of the above compound is 488.
8. Concerning claim 36, Adachi et al. describe the use of the electroluminescent device in displays, such as in a vehicle, computer, television, etc. (claim 8).
9. Claims 1-5, 8, 16, 18, 29, 32, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over D'Andrade et al. (2002/0197511) in view of Ueda et al. (JP 2001-016048) with evidence supplied by Wieczorek et al. (Archivum Immunologiae et Therapiae Experimentalis, vol. 34, no. 3, pp. 323-326, 1986).
10. Concerning claims 1-5, 8, 16, 18, 29, 32, and 35-36, D'Andrade et al. describe an electroluminescent device comprised of a pair of electrodes, and a light emitting layer (in this case comprised of 3 sublayers), (fig. 9) where each of the sublayers is comprised of a host (CBP) and a phosphorescent dopant which when combined emits **white** light based on phosphorescence (claim 2). D'Andrade et al. are silent on the use of a diazocarbazole compound in the device.
11. Ueda et al. describe electroluminescent devices wherein at least one layer of the device incorporates a molecule of the following general formula [0028] where  $Z_{15}$  is an aromatic heterocycle, specifically including pyridine [0046] and  $Z_{16}$  is an aromatic

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heterocycle or aromatic hydrocarbon, where the heterocycle also includes pyridine [0047]. Ueda et al. give several specific examples, (XVII-1 to XVII-8) which illustrate that the position of the nitrogen atoms in the ring  $Z_{15}$  and  $Z_{16}$  are not critical to the function of the molecule as an electroluminescent material. Based on the general teaching by Ueda et al., the second structure shown is immediately envisaged.



12. Based on the close similarity in structure to carbazole, and the fact that the structure described by Ueda et al. is known as an electroluminescent material, and since the immediate precursor (first compound shown below) to a CBP analog (second compound shown below) is a known compound, as evidenced by Wiczorek et al., and since Ueda et al. disclose the reaction of nitrogen-containing carbazole compounds with aromatic halides [0094], to show that extra nitrogen atoms in the carbazole analog do not affect the coupling reaction, it would have been obvious to one of ordinary skill to synthesize the analog for use as a host material in a phosphorescent electroluminescent device as described by Adachi et al., since the material would be predicted to function in the same manner as CBP.



13. Claims 1-5, 8, 16, 18, 29, 32, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over D'Andrade et al. (2002/0197511) in view of Ueda et al. (JP 2001-016048) with evidence supplied by Thelakkat et al. (Polymers for Advanced Technologies, vol. 9, pp. 429-442, 1998).

14. Concerning claims 1-5, 8, 16, 18, 29, 33-34, and 36, D'Andrade et al. describe an electroluminescent device comprised of a pair of electrodes, and a light emitting layer (in this case comprised of 3 sublayers), (fig. 9) where each of the sublayers is comprised of a host (CBP) and a phosphorescent dopant which when combined emits **white** light based on phosphorescence (claim 2). D'Andrade et al. further include a hole blocking layer between the host and electron transporting layer, where the blocking layer serves to block holes passing through the emission layer, and excitons formed in the emission layer. D'Andrade et al. utilize bathocuproine to serve this function [0058], and are silent on the use of diazocarbazole compounds in the device in the hole blocking layer.

15. Ueda et al. disclose that the diazocarbazole compounds are useful as emission materials in an electroluminescent device, without being doped into a carrier. [0114-0120] Therefore, the compounds must transport either holes or electrons inherently.

16. Thelakkat et al. teach that compounds which are suitable as electron transport/hole-blocking materials, and that for blocking the flow of holes towards the cathode, the molecule should have a low HOMO level, (particularly when compared with the adjacent hole-transporting/host layer) which inhibits hole transport. Thelakkat et al. teach that potential candidates as electron transport materials are  $\pi$ -electron deficient nitrogen or oxygen containing heterocycles, including pyridines (page 430).

17. Since the compounds described by Ueda et al. can essentially be considered to be pyridine dimmers, and compared with the structure of the closely related carbazole (which makes up CBP), it is apparent that the diazocarbazole compounds are more  $\pi$ -electron deficient than carbazole, and would therefore be an obvious candidate for use in a hole blocking layer, since the hole transport capability would be reasonably predicted to be significantly less than the adjacent carbazole containing layer, due to the presence of extra nitrogen atoms in the heterocyclic structure. It would have been obvious to one of ordinary skill in the art to use the compounds described by Ueda et al. as a hole blocking layer in a device as described by D'Andrade et al. since they would be predicted to serve the function of preventing hole transport from the host layer.

### ***Double Patenting***

18. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140



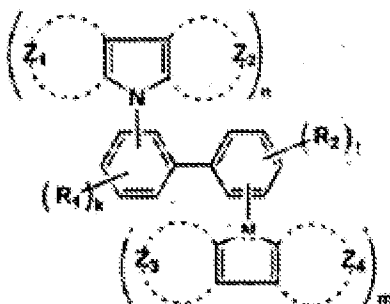
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F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

19. Claims 1-5, 8, 16, 18, 29, 33-34 and 36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 7, and 16 of copending Application No. 10/946499. Although the conflicting claims are not identical, they are not patentably distinct from each other because Application No. 10/946499 claims an electroluminescent device with a light emission layer comprised of a particular compound, and a hole blocking layer comprised of a particular compound, where the light emission is phosphorescent (claim 16), and the material of the hole blocking layer is defined by the structure below, where  $Z_1$ - $Z_4$  represent heterocyclic rings containing nitrogen atoms. (claim 7)



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20. Since there are a limited number of options for nitrogen containing heterocyclic rings, the elected structure of the present invention would be obvious to one of ordinary skill in the art. The present claims are not limited to a particular material in the phosphorescent light emitting layer, but given the broad language of the present claims (i.e. comprising), it is clear that they are not restricted by the nature of the phosphorescent material. Therefore, one of ordinary skill in the art would arrive at the present invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1-5, 8, 16, 18, 29, 33-34 and 36 are directed to an invention not patentably distinct from claims 1, 7, and 16 of commonly assigned Application No. 10/946499. See Discussion Above.

The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP Chapter 2300). Commonly assigned Application No. 10/946499, discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(e), (f) or (g) and the conflicting inventions were not commonly owned at the time the invention in this application was made. In order for the examiner to resolve this issue, the assignee can, under 35 U.S.C. 103(c) and 37 CFR 1.78(c), either show that the conflicting inventions were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications pending on or after December 10, 2004.

### ***Response to Arguments***

21. Objections to the specification have been withdrawn in light of Applicant's amendments.

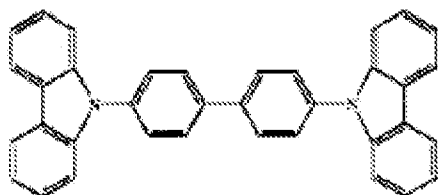
22. The provisional double patenting rejection against 11/632758 is withdrawn after further consideration, since the claims are not sufficiently detailed to teach the elected species. However, the claims would conflict with the generic claims of the current application.

23. Applicant's arguments filed 03/13/2008 have been fully considered but they are not persuasive.

24. Applicant argues that the use of Wieczorek et al. is non-analogous art. However, the rejection is based upon Adachi et al. who teach the structure of the electroluminescent device, and Ueda et al. who provide rationale to use the diazacarbazole heterocyclic ring structure in the materials in the electroluminescent device. Wieczorek et al. simply provides evidence to support the assertion that the synthesis of the specific species would be within the ability of one of ordinary skill. The relevant field of endeavor is organic synthesis, specifically the synthesis of the elected species. It is well within the ordinary skill to search the relevant databases for chemical

entities which can be used synthetically. The fact that the compounds described by Wieczorek et al. were synthesized for use in medicines is secondary to the fact that they are readily available to one of ordinary skill in the art of organic synthesis as synthetic precursors. The rationale and motivation to use the resulting compound in an electroluminescent device is taught by Ueda et al. who teach the use compounds with that heterocyclic structure in electroluminescent devices. The motivation to use the compounds in a specific manner is based upon the structural similarity to compounds which are known to be used for that purpose, specifically CBP. The question then becomes whether the behavior of the compounds are predictable. Since Ueda et al. already teaches their use in electroluminescent devices, they are known to be conductive, and also to emit energy upon stimulation by an electric current, and compounds containing the heterocycle would therefore be predicted to function in electroluminescent devices.

25. Applicant argues that unexpected results are derived from using the heterocyclic compound described compared with the known compound CBP, as illustrated in tables on pages 134, 140, 142, 144, and 146. While the tables do show a difference between compounds of the invention and CBP, the comparisons are not directly analogous, and so the comparison cannot be evaluated. Firstly, There is no comparison shown between CBP (shown below), and it's counterpart, corresponding to inventive compound 7 (see page 49). Since the direct comparison has not been made, the argument for unexpected results cannot be evaluated.



26. Furthermore, while several compounds are compared with CPB, the compounds shown are not commensurate in scope with the claim language, particularly in claims 16, 18, and 29, which when defining the R-groups, state only "hydrogen atom or **substituent**." The limitation **substituent** encompasses **any** potential substituent, and not supported by the examples tested.

27. A direct comparison would be persuasive in overcoming the rejections, with the provision that the scope of the claims was supported by the scope of the compounds tested.

28. Applicant further argues that Thelakkat is not relevant for providing rationale for the use of the diazacarbazole compounds as hole-blocking materials, in combination with D'Andrade et al. and Ueda et al.. In this case, D'Andrade et al. describes the structure of the electroluminescent device, including a hole blocking layer, while Ueda et al. discloses the diazacarbazole structure in electroluminescent compounds. Since the compounds described by Ueda et al. are used in electroluminescent layers, without the addition of other conducting materials, they must therefore be inherently charge transporting, as discussed above. Thelakkat provides evidence to support the assertion that the electron transporting nature of the diazacarbazole compounds is predictable based upon their structure. Thelakkat teaches basic concepts concerning electron

transporting and hole blocking materials, and discloses the necessary properties.

Thelakkat teaches that compounds which are  $\pi$ -electron deficient function as electron transporting, and hole blocking materials, and such compounds include  $\pi$ -electron deficient heterocyclic rings such as pyridine rings. Given this teaching, it is reasonable to predict that the nitrogen containing diazacarbazole heterocycle would be more  $\pi$ -electron deficient than the corresponding carbazole compound, and would therefore predictably function as an electron transporting/hole blocking material, particularly when compared with CBP as a host material.

### ***Conclusion***

29. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL E. NELSON whose telephone number is (571)270-3453. The examiner can normally be reached on M-F 7:30am-5:00pm EST (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael E. Nelson  
Examiner  
Art Unit 1794

/Callie E. Shosho/  
Supervisory Patent Examiner, Art Unit 1794

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